

## A NEW SPECIES OF CUCURBITA FROM ECUADOR

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### ABSTRACT

A new species of *Cucurbita* from South America is described. This species, *Cucurbita ecuadorensis*, is the first wild species of *Cucurbita* described from northwestern South America. *Cucurbita ecuadorensis* has been excavated from pre-ceramic, pre-maize levels in Coastal Peru. It appears to be more closely related to the South American *C. maxima* and *C. andreana* than to other species in the genus.

Recent interest in the solitary bees of the genera *Peponapis* Robertson and *Xenoglossa* Smith stimulated an intensive search for species of *Cucurbita* and the bees associated with each species (Hurd & Linsley, 1964, 1966, 1967). On a collecting trip for solitary bees, Dr. and Mrs. A. E. Michelbacher were in Ecuador from January 27 to February 16, 1965. They made three collections of a large, wild gourd. Through the courtesy of the Michelbachers, seeds from these collections were grown in experimental gardens and greenhouses at Tucson, Arizona, and La Jolla, California. These collections belong to an undescribed species of *Cucurbita*.

*Cucurbita ecuadorensis* Cutler & Whitaker, sp. nov.—Fig. 1-3.

Plants scandens ad 10 m fortasse plus alta, spicula et trichomata diffusa, interdum ad nodos radicans, cirrhi crassi, saepe tripartiti et plerumque circinati; folia plerumque 12-32 cm lata, lato-ovato ad reniforma, lamina opaco-viridis, plerumque superficie pallido-viridis, basi lato-cordata, quinquelobata, lobi laterales saepe vadosiores, lobi basales circiter ad dimidium distantiae versus costam divisi, apice mucronati, supra diffuso-ciliati, subtus pubescentes, margines irregulares, petioli maturi, 8-16 cm longi, plerumque laminam aequantes, trichomatibus et apiculis ornati; flores solitarii campanulati aurantiaco-fulvi; flores staminati pedicellati, pedicellis brevibus ciliatis, 2-5 cm longis, corolla 5-8 cm longa, tubus 3-5 cm longus, calyx ciliatus, lobi angusti et acuti, 1-2 cm longi; flores pistillati pedicellati, pedicellis brevibus, ciliatis, 2-5 cm longis, corolla 5-9 cm longa, tubus 3.5-5 cm longus, lobi calycis filiformes, 1 cm longi, pedunculi graciles, 4-8 cm longi angulati, apiculati, origine vix turgidi; pepo globosus vel subglobosus, 16 cm diametro, cremeus ad opaco-viridis, plerumque cremeus et lineis viridibus maculisque ornatus, interdum maturite fulvi, pulpa alba, saepe acris sed magis sapore placenti parata,

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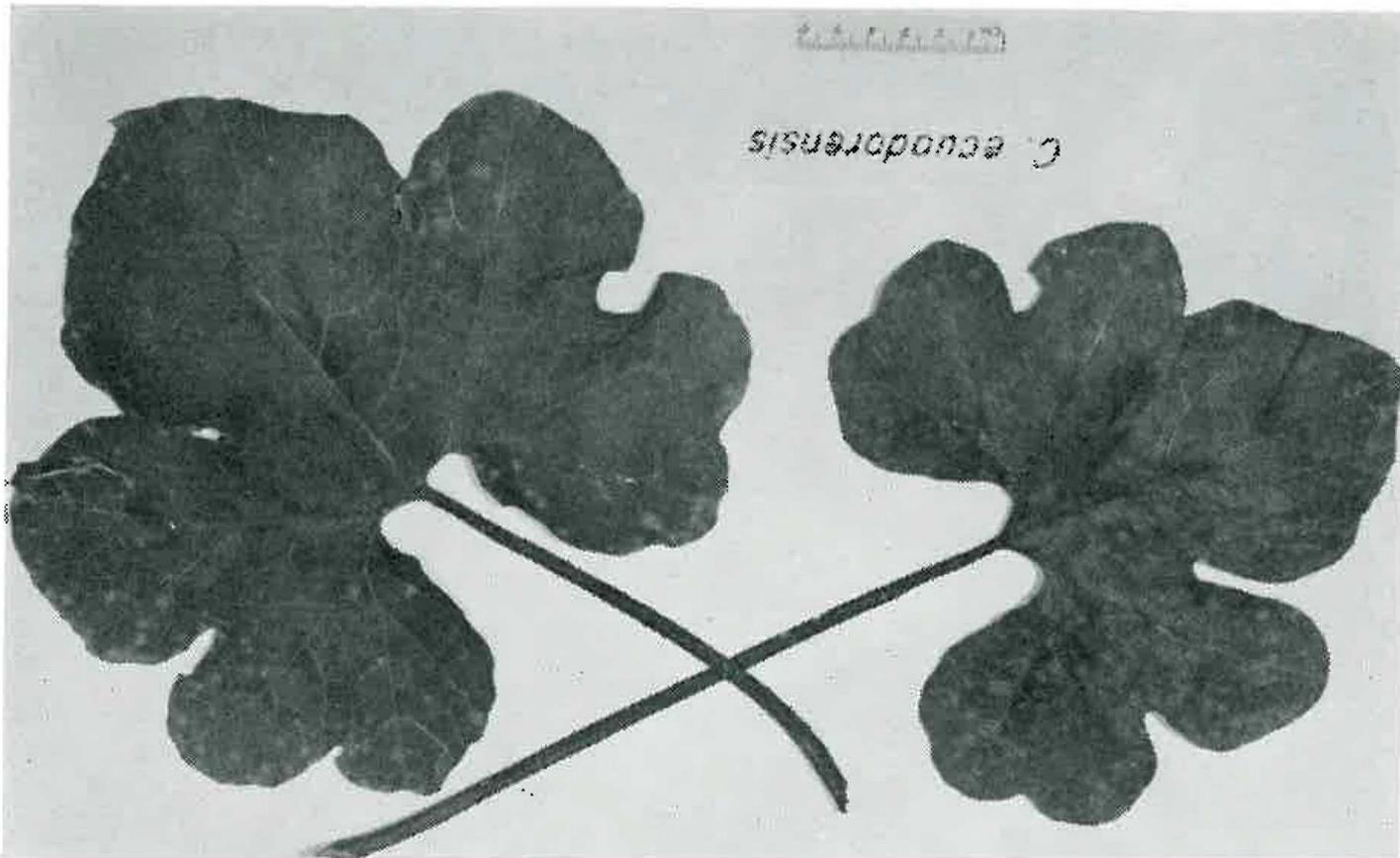


Fig. 1. Typical mature leaves of *Cucurbita ecuadorensis* grown at La Jolla from seed collection in Guayaquil, Ecuador; note 5-lobed leaves with traces of secondary lobing;  $\times 3/10$ .

loculi 3, semina ovata, 1.1-1.5 cm longa, 0.7-0.8 cm lata, corpus album ad brunneolum, margo quam corpore conspicue opacior.

*Annual* when grown in California and Arizona; *vine* up to 10 m or more, often clambering over shrubs; *stems* striate with scattered spicules and hairs, sometimes rooting at the nodes; *tendrils* thick, usually tripartite, often coiled on themselves; *leaves* usually 12-32 cm wide, broadly ovate to nearly reniform in outline; *blade* dark green, usually with light green blotches on upper surface, base broadly cordate, deeply 5-lobed, lateral lobes often shallower, basal lobes often divided nearly  $\frac{1}{2}$  way to mid-vein, tips of lobes mucronate, upper surface with scattered hairs, lower surface pubescent; margins irregular, denticulate at vein ends; *petiole* 8-16 cm long when mature, usually as long as blade, with hairs and spicules; *flowers* solitary, campanulate, orange-yellow; staminate on short, hairy pedicels 2-5 cm long; corolla 5-8 cm long; tube 3-5 cm long; calyx hairy, lobes narrow and pointed, 1-2 cm long; pistillate on short, hairy pedicels, 5 cm long; corolla 5-9 cm long; tube 3.5-5 cm long; calyx-lobes filiform, 1 cm long; *peduncle* slender, 4-8 cm long, angled, spiculate, slightly enlarged at attachment; pepo to 16  $\times$  16 cm, creamy to dark green, usually creamy with green lines and spots, sometimes turning yellow at maturity; flesh white, stringy, sometimes bitter, but usually with pleasant cucumber-like flavor; locules 3; *seeds* ovate, 1.1-1.5 cm long, 0.7-0.8 cm wide; body white to tan; margin conspicuous, darker than body.

Ecuador: 5 mi W of Guayaquil; abundant, no bloom; dry gourds of previous year hanging from shrubs, 2 Febr 1965 (holotype MO, isotype US). 19 mi N of Balzar, ca 60 mi N of Guayaquil, fruits from previous years hanging from shrubs, 4 Febr 1965 (MO, US). On the river nr Ambuqui, NE of Ibarra, in deep hot valley, alt ca 2,500 ft, 14 Febr 1965

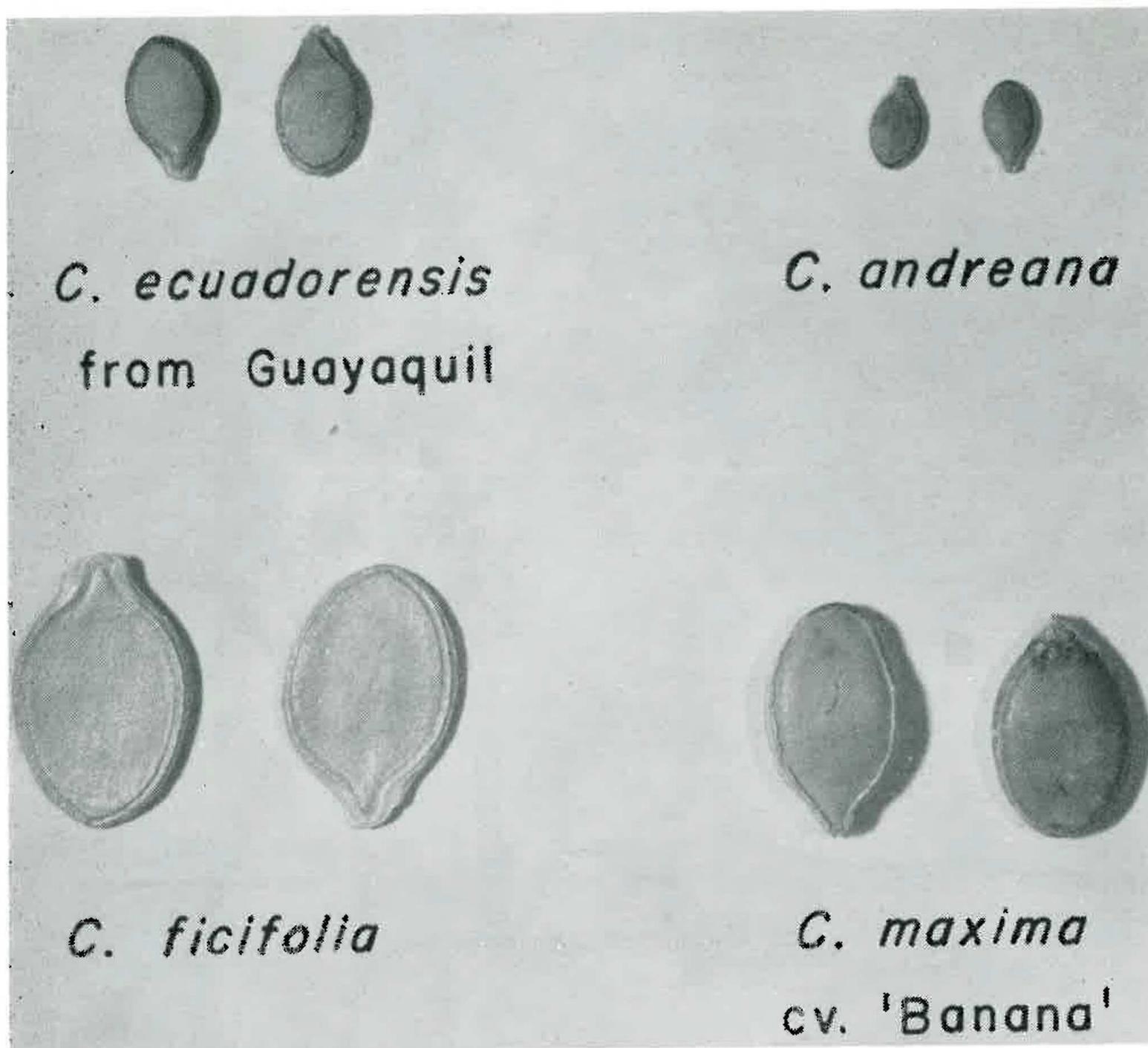


Fig. 2. Seeds of *Cucurbita ecuadorensis* compared with those of closely related species: *C. andreana*, *C. maxima* & *C. ficifolia*;  $\times 1\frac{1}{2}$ .

(MO). Nr Ambuqui, hwy 1, 14 Febr 1965 (MO). 10 mi N of Guayaquil, 15 Febr 1965. All by *Michelbacher & Michelbacher s.n.*

Peru: Site PV45-136 on Bay of Ventanilla, cut 1, level 7, and cut 1A, level 6. Estimated to be from 3000 B.C., *Edward P. Lanning s.n.* (MO).

California: La Jolla, grown from seeds collected by the Michelbachers at the type locality (MO, US). La Jolla, grown from seeds collected by the Michelbachers nr Ambuqui; Highway 1, (MO, US). Both by *Whitaker s.n.*

The species differs from the weedy *Cucurbita andreana* Naud. in having large, deeply lobed leaves, and a large, globular non-bitter fruit. The only other pre-Columbian species of *Cucurbita* from South America are the cultivated ones, *C. ficifolia* Bouche, *C. moschata* Duchesne ex Poir. and *C. maxima* Duchesne. *Cucurbita ecuadorensis* differs from wild Central American and North American species by the large leaves and fruit, by the virtual absence of bitter taste in the flesh of the fruit, and by the prominent seed margins. The margins are slightly darker than the cream color or light tan seed body.

Rinds, seeds and peduncles of a species of *Cucurbita*, similar to *C. ecuadorensis*,

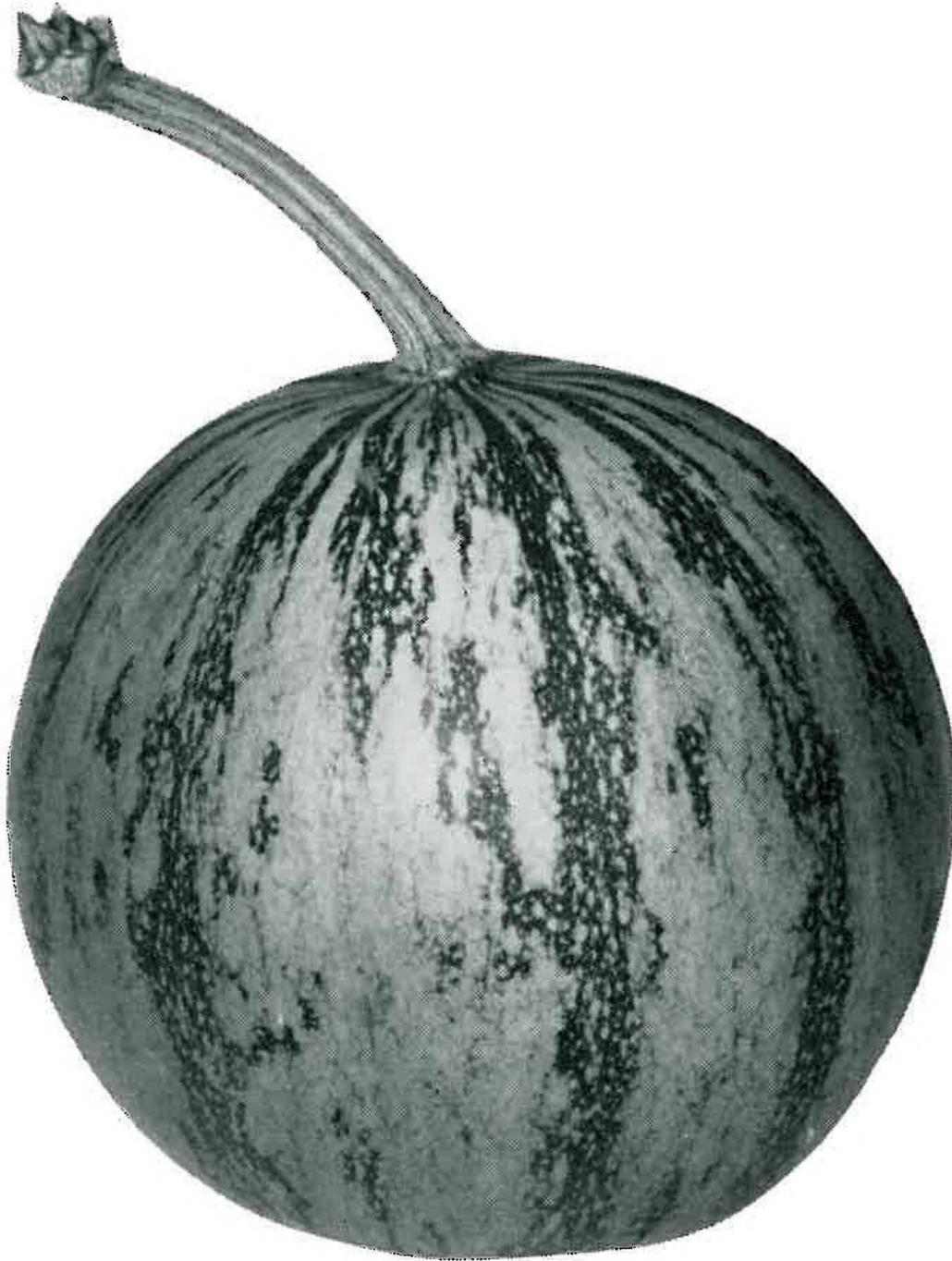


Fig. 3. Fruit of *Cucurbita ecuadorensis*;  $\times 3/5$ .

have been excavated by Lanning (1967) from pre-Columbian pre-ceramic and pre-maize sites in coastal Peru. He lists these specimens as *C. andreana* and as a wild cucurbit.

*Cucurbita ecuadorensis* has 20 pairs of chromosomes, the same as other species of *Cucurbita*. It hybridizes readily with *C. maxima* (Whitaker, Bemis & Wall, unpublished data). Fertility decreases to about 50% in the  $F_1$  plants, but  $F_2$  progenies, and backcrosses to either parent can be obtained. Fertility is greatly decreased in most individuals in the  $F_2$  and backcross progenies. Some individuals in these progenies are characterized by complete sterility of the staminate or pistillate flowers. Also, various patterns of chlorophyll deficiencies of both leaves and stems occur.

Hybrids between *Cucurbita ecuadorensis* and the following species have been made and  $F_1$  plants grown: *C. moschata*, *C. lundelliana* Bailey, and *C. okeechobeensis* Bailey. The fertility of these hybrids has not yet been determined. *Cucurbita ecuadorensis* was included in a numerical taxonomic study of *Cucurbita* (Rhodes *et al.*, 1968). The results indicate it was *not* closely associated with other

species of *Cucurbita* or with interspecific hybrids, but it did show some affinity with the *lundelliana* group (*C. lundelliana*, *C. okeechobeensis* and *C. martinezii* Bailey). There was also an indication of association with *C. ficifolia*, a cultivated species, sympatric in part of its range with *C. ecuadorensis*.

J. R. Wall (unpublished data) has studied the electrophoretic characterization of nine populations of *Cucurbita* species and the hybrid of *C. ecuadorensis* × *C. maxima* cv. 'Pink Banana'. He has demonstrated that, on the basis of electrophoretic mobilities of leucine amino-peptidase (LAP) and alpha-naphthyl acetate esterase (Est), *E. ecuadorensis* can be separated from other species of *Cucurbita*.

Aside from its interest as an important factor in the co-evolution of the bee, *Peponapis* in South America, *C. ecuadorensis* appears to be the first truly wild species of *Cucurbita* described from South America. The feral species, *C. andreana* Naud. (Crovetto, 1965), and the closely related cultivated species, *C. maxima* Duch., are the only other species of the genus thought to have originated in South America. The discovery of this new species suggests that insects may be useful guides to unreported species in *Cucurbita*. Furthermore, some modification of current ideas of the origin, domestication, and dispersal of the cultivated *Cucurbita* may be in order.

## LITERATURE CITED

- CROVETTO, R. M. 1965. Flora de la Province de Buenos Aires. *Cucurbitaceae*. 4(5a):390-407.
- HURD, P. D., JR. & E. G. LINSLEY. 1964. The squash and gourd bees—genera *Peponapis* Robertson and *Xenoglossa* Smith—inhabiting America north of Mexico (*Hymenoptera: Apoidea*). *Hilgardia* 35(15): 375-477.
- . 1966. The Mexican squash and gourd bees of the genus *Peponapis* (*Hymenoptera: Apoidea*). *Ann. Ent. Soc. Amer.* 59: 835-851.
- . 1967. South American squash and gourd bees of the genus *Peponapis* (*Hymenoptera: Apoidea*). *Ann. Ent. Soc. Amer.* 60: 647-661.
- LANNING, E. P. 1967. Peru before the Incas. Prentiss-Hall, N. H. pg. 53.
- RHODES, A. M., W. P. BEMIS, T. W. WHITAKER & S. G. CARMER. 1968. A numerical taxonomic study of *Cucurbita*. *Brittonia* 20: 251-266.